

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

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COUNTRY Hungary/USSR

REPORT

SUBJECT Specifications of Hungarian-Manufactures
"Complete Catalytic Laboratories, Type ZOR -
1"/Hungary Sells Thirty Units of Same to the
USSR

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REFERENCES

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THIS IS UNEVALUATED INFORMATION

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1.

[redacted] one sample of a system for test-
ing catalysts and catalytic reactions and also for teaching purposes.
This system was invented by Dr. Lajos Meszaros, Associate Professor
(the Hungarian title is "Adjunktus" or "Docens") in the Institute for
Applied Chemistry, Szeged Jozef Attila University, Hungary.
[redacted] Meszaros received a reward of one million forints, for having
invented the system. The system is called "Complete Catalytic
Laboratories, Type ZOR - 1" and is marketed by the Hungarian
organization, METRIMPEX.

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3.

The Hungarians state that the laboratory is intended for the production
of furan from furfural by a vapor-phase heterogeneous catalytic method
and that it has proved most useful when tested for the following
reactions:

a. Conversion of furfural into furan with the use of pyro-
phorous lead.

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b. Production of pyrrole from furan and pyrrolidine from
tetrahydrofuran.

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c. Production of maleic anhydride and fumaric acid from furan and furfural

d. Cracking of ricinoilic acid methylester

e. Dehydration with alcohol insensitive to heat

4. Each of these laboratories sells for somewhere between US\$10 thousand and US\$30 thousand. The METRIMPEX people at the Milan exhibit said that Hungary has sold more than 30 of these laboratories to the USSR. [] the unit on display at Milan had all of the labels in Russian.

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5. Generally speaking, [] the ZOR - 1 is somewhat outmoded. With modern instrumentation, the whole system could be compressed into a much smaller space. In particular, the control desk and switchboard could be much more compact. Additionally, the ZOR - 1 has no provision for the automatic control of the reaction products, which is where gas chromatography is used today. [] the only "analytical" device in the unit is an Orsal-Pfaffner type gas analyzer, an outdated, primitive device.

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6. The system, in sum, contained absolutely nothing new. More interesting is the fact that the Soviets buy such systems in such large quantities. [] the significance of this lies in one or both of the following: the Soviets cannot build such laboratories (but must import them); the Soviets have suddenly put so much emphasis on such investigations that their own manufacturing facilities cannot meet the demand. In either case, why buy such outmoded instrumentation?

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7. Meszaros is a [] friendly [] man. He was with the METRIMPEX crew [] He wants to enter into a business arrangement with a US firm, to license that firm to produce his unit in the US.

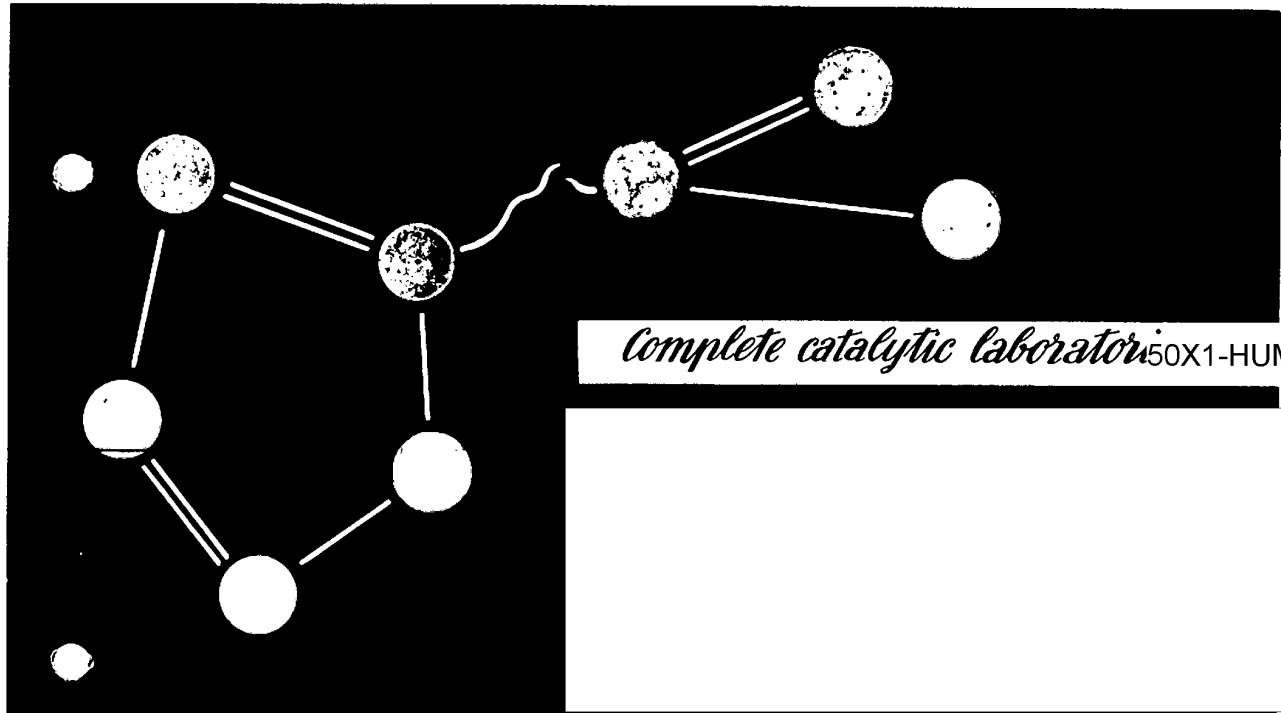
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COMPLETE CATALYTIC LABORATORIES

I.

Process and Equipment for the
Production of Furan from Furfural
by Vapour-Phase Heterogeneous
Catalytic Method

PRELIMINARY INFORMATION

LABOR

METRIMPEX

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PRELIMINARY INFORMATION

COMPLETE CATALYTIC LABORATORIES

New Type Number ZOR - 1

Reactors of various design, working with heterogeneous catalysts are quick in gaining ground in up-to-date large-scale chemical industry. Every country aiming at the development and modernization of its chemical industry looks with expectation at these production methods, as under favourable economic conditions catalytic plants are suited for the production of large quantities of raw materials and semifinished products for processing plants. In the field of organic chemistry reactors are widely used for the production of basic materials /as, in the manufacturing of phenol and halogen derivatives, in petroleum processing, oxidation of hydrocarbons, etc./ and are of great importance also in other fields as the use of catalysts permits the carrying out of hydrogenation, dehydrogenation, hydration, hydrolysis, hydroformylation, oxidation, etc. The introduction of contact catalytic methods renders high-grade automation possible, effectively contributing to the cutting down of the prices of chemical products.

Contact catalytic methods are prominently important in practice. It is necessary that all those who expect to work with it should acquire a deeper knowledge of, and a large-scale training in, the subject. Proper equipment is essential in every institution taking part in this work.

METRIMPEX proposes to supply both research and educational institutes with equipments suitable for this purpose - offering them a complete set of laboratories working with vapour-phase heterogeneous catalytic methods, products of the Budapest Factory for Laboratory Equipment.

The set of laboratories will prove extremely useful

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- 1 in experiments of research institutes for organic chemistry, for the plastics industry, for the petroleum and natural gas industries, aiming at the production of new starting materials;
- 2 in the investigations of processes already in use, as well as in their development and improvement;
- 3 in research and investigations into catalysts and their life-time;
- 4 for technical universities and postgraduate training institutes for engineers, as experimental and educational laboratories, facilitating the study of catalytic processes.

The complete laboratory consists of a number of units, but one of them is enough to start a wide-range application of contact catalytic methods. The complete catalytic laboratory built-up along the metal-rack system lends itself to the execution on a laboratory scale of a large number of industrial production methods of organic chemistry. Though these experiments can only be performed on a laboratory scale, they can be readily scaled up for use in production, as only the reactor, a laboratory tube furnace, is to be duplicated to form up to several hundreds of bunches of tubes. When designing a plant for the production of some chemical compound, optimum conditions for the reaction, e.g. temperature, continuous feed rate, the ratios of the initial substances, the chemical composition and the crystal structure of the optimum charge of reactors ensuring economical production are to be established on a laboratory scale. The equipment proves equally useful in the development of new processes and in the improvement of existing ones, as well as in the investigation of the service life of catalysts. With the complete laboratory equipment a great variety of research programmes can be carried out.

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The first unit of the catalytic laboratory complex is an equipment designed for the production of furan from furfural. Patents put at the disposal of the buyer permit the determination of the optimum parameters of the reaction, and to use it for designing of manufacturing plants. Naturally, the equipment can also be used for the investigation of any other reactions of similar type.

The complete catalytic laboratory is planned to have about 20 units to permit the carrying out of a very wide range of chemical reactions of various types in the field of vapour-phase catalysis. The volume of the catalyst area varies from 20 ml to 60 litres in the various reactors. Reactors show a great variety of types: tube furnaces, tray tube furnaces, melt-bed reactors, mercury-vapour bed reactors, disk reactors, spherical reactors, using metal fog and metal fume catalysts, etc. Another catalogue will furnish ample information of them.

The complete catalytic laboratory equipment, unique in its kind, is the result of the research and educational work of Dr. Lajos Mészáros, first assistant in the Institute for Applied Chemistry of the Szeged József Attila University, and was patented as such.

Our first laboratory unit presented here is an equipment for the production of furan from furfural by a vapour-phase heterogeneous catalytic method. This laboratory has proved most useful when tested for the following reactions:

1. Conversion of furfural into furan with the use of pyrophorous lead;
2. The production of pyrrole from furan and pyrrolidine from tetrahydrofuran;
3. The production of maleic anhydride and fumaric acid from furan and furfural;
4. The cracking of ricinoilic acid methylester;

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5. Dehydration with alcohol insensitive to heat.

In addition to the above, a number of other reactions were made.

The equipment may be used also for the execution of other research programmes.

The equipment is partly automatized which ensures the strict observation of the experiment parameters.

The laboratory consists of two main parts:

Chemical instrument board and
process control desk

The chemical instrument board contains liquid and gas bed devices, a gas pressure control, an adjustable differential pressure gauge, a photoelectric - cell controlled pressure gauge to ensure a steady gas feed, all of them connected to the reactor. The nickel-wall reactor is embedded in a heavy aluminium block providing homogeneous heat distribution. The detectors of the thermocouples are under the continuous control of a mercury thermometer. An adsorption tower column packed with carbon, a desorption device and a laboratory wet gasometer serve the adsorption of gases participating in the reaction, and the control and measurement of end gases.

Control desk and switchboard form a single unit. The switchboard includes a voltmeter to measure the heating voltage, a heat regulator controlled by a photo-electric-cell, instruments measuring and recording the temperatures inside the reactor, a schematic diagram of the reactor with light signals, a toroidal transformers for voltage control and other fuse and switch devices and an electric clock.

The equipment includes the following units and parts:

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Former Type Number	New Type Number	
3621.A	ZOR-1-1	Chemical instrument board, mounted, with connections to mains, electric switch cupboard and exhaustor pipe, with a complete, mounting surface of 7 sq.m
3621.B	ZOR-1-21	Switch cupboard for 3x380 V voltage, with measuring, recording and regulating instruments. Control desk with push-buttons, thermoelement change-over switch, various chamber switches. Neon-tube fittings, 3 x 40 W, 220 V, light deflecting grate, suspended pendulum device
3831	ZOR-1-22	Exhaustor, extra quality, 400 cu.m per hour performance, built-in motor for 220/380 V Air compressor with automatic switch, built-in single-stage motor, pressure gauge, safety valve and oil expeller. Output at 6 kg/sq.cm. 8,1 cu.m. per hour
525		Laboratory refrigerator, 2000 cal/hr performance, electric control, can maintain a temperature of -20°C. Three chambers, the coolers are of non-corrosive material. Mounted on four trundles; for 220/380 V
3621.D	ZOR-1-24	Feed pump mounted on a tube frame on trundles, built-in motor to feed liquid volumes of 25 to 1000 ml.

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Former Type Number	New Type Number	
3621.18	ZOR-1-3	Lamp /to illuminate burettes, to facilitate reading/ with a cable for 24 V
3621.1	ZOR-1-2	Steel still /suitable for the distillation of furfural/, with built-in electric heater, connection cable.
3621.C	ZOR-1-11	Reactor /with a nickel tube inset, built-in heaters, thermoelements, - complete/, for a maximum operation temperature of 500°C
3621.80	ZOR-1-23	Photo-transistor pressure gauge for 24 V voltage
3621.71	ZOR-1-6	Rotameter with back light, for 24 V with tubes calibrated for various gases /air, carbon dioxide, nitrogen/ and for various measuring ranges, to measure 5 to 400 litres gas per hour
3621.69	ZOR-1-8	Fine doser device, a glass apparatus operated by air overpressure. With a slit-controlled doser, to feed 0 to 30 ml of substance per hour.
3621.49	ZOR-1-9	Differential manometer combined with a needle valve, for the pressure range of 100-0-190 mm Mercury manometer for the pressure range of 190-0-19 mm
3621.22	ZOR-1-12	Metal Liebig condenser with a corrosion resisting inset tube
3621.35	ZOR-1-14	Combined condenser I /serpentine-ball cooler/

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Former Type Number	New Type Number	
3621.39	ZOR-1-15	Water-trap tap battery
3621.40	ZOR-1-16	Coal tower, simple-wall, 300 mm long
3621.41	ZOR-1-17	Coal tower, jacketed, 300 mm long
3621.42	ZOR-1-18	Coal tower, simple-wall, 600 mm long
3621.43	ZOR-1-19	Coal tower, jacketed, 600 mm long
		Laboratory wet gasometer of 2 litres, 360° scale, with thermometer, mano- meter tube, water funnel, complete
3621.36	ZOR-1-29	Combined condenser II
3621.8	ZOR-1-30	Large cooling panel of about 0,4sqm. cooling surface /to be connected to water mains/
3621.5	ZOR-1-20	Steam boiler, 0,6 kg/sq. cm over - pressure, pressure gauge, safety valve water level indicator, built-in elec- tric heating for 220 V, metal stand- ard junction ground, connecting cable to mains
3621.F	ZOR-1-12	Thermostat to thermoelements, calib- rated to +50°C/cold-point thermostat/ for 220 V
3621.24		Clamp nut I, for clamping laboratory stands of 12 mm and 22 mm diameter
3621.76		Nut II, for clamping laboratory stands of 12 mm and 22 mm diameter
3621.20		Burette holder with three clamps, for diameters from 10 to 75 mm

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Accessories

Former Type Number	New Type Number
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3621.11		Upholstered swivel chair with back
3621.88		Mounting ladder on trundles, collapsible, with a small tool table
		Mixer and kneader 0,9 litre working capacity, stainless steel lining and stirrer, built-in motor for 220 V
3321	OA-201	Gas analyser, Orsat-Pfeiffer type
2171	LE-304	Stirring motor with flexible shaft
2132	LE-303	Stirring motor with friction disk
2181	LE-101	Laboratory ball mill
2162	LE-203	Universal shaking machine.
		Nuxit AL active carbon /in 20 litre can/
		Catalyst/vanadium pentoxide on silica gel carrier/
		Glassware
		Hand tools for overhauling

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The Operator's Manual supplied with the 1st laboratory, of about 400 pages falls into three parts:

- a/ Theoretical Part and Literature
- b/ Process for the Production of Furan from Furfural
- c/ Technical Description

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Part I /a/ a concise monograph on the production of furan from furfural gives general information on catalysis and on catalysts. It describes in detail the adsorption of gases and vapours on solids and the various adsorption systems. A special chapter has been devoted to the characteristics, structure and uses of pyrophorous metals.

Part II /b/, gives a general idea on operations in a catalytic laboratory, on the handling of the contact apparatus, on the technique of feeding the reaction components in the reactor. It describes the experimental equipment for the production of furan in full details and supplies the complete technology of this process. It gives directions as to the preparation of test records, the calculation of specific factors characteristic of the reaction, etc. It describes for the methods preparation and the testing of a number of catalysts.

Part III /c/ contains instructions for the maintenance and repair of the instruments and apparatus.

Operator's Manuals for other units are prepared along the same principles and are supplied together with the equipment.

Marketed by

METRIMPEX, Hungarian Trading Company for Instruments

Budapest, V. Nádor-u.21.

Phone: 126-620. Cables: METRIMPEX BUDAPEST

Manufactured by

Factory for Laboratory Equipment

Budapest, IX. Tüzoltó-u.54.